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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/525,443

02/24/2005

Tadashi Takahashi

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20792 7590 08/24/2009
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EXAMINER

BURKHART, ELIZABETH A

ART UNIT

PAPER NUMBER

1792

MAIL DATE

DELIVERY MODE

08/24/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/525,443	Applicant(s) TAKAHASHI ET AL.	
	Examiner Elizabeth Burkhart	Art Unit 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 June 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,8,10,11,13 and 15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,8,10,11,13 and 15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1, 8, 10, 11, 13, and 15 are pending in the application. Amended claims 1 and 8 have been noted. The amendment filed 6/4/2009 has been entered and carefully considered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 8, 10, 11, 13, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al and Sasaki et al.

Takahashi teaches a CVD method for preparing a metal sulfide film comprising: vaporizing metal halide (FeCl_3) and a thioamide compound (thioacetamide), and reacting the metal halide with the thioamide compound at atmospheric pressure in a heated film forming section to produce a metal sulfide film (pyrite FeS_2) on a substrate. The growth temperature may be 723-823 K (450-550 °C) (Abstract, p. 2346-2347, Table 2). The specification states that trimethyltriazine is formed from thioacetamide at around 400°C (p. 12, lines 3-5) and that a suitable growth temperature may be 350-450°C (p. 9, line 12). Therefore, the method of Takahashi would have inherently formed a triazine compound (trimethyltriazine) since it uses thioacetamide as a precursor within the specified range of growth temperatures.

Takahashi does not teach a growth temperature of 375-425°C.

Sasaki teaches that recently single phase pyrite film (marcasite- and pyrrhotite-free) was prepared by a low pressure MOCVD process. The high partial pressure of sulfur and high temperature can be a critical factor to prepare pure pyrite and once these conditions were satisfied, pure pyrite phase can be prepared by other methods. The Fe/S flux ratio and temperature were adjusted to form a marcasite- and pyrrhotite-free pyrite film. A pure pyrite film may be formed at temperatures higher than 300°C and at a Fe/S flux ratio higher than 6.8 (p. 1193-1195).

It would have been obvious to one of ordinary skill in the art at the time of invention by applicant to adjust the Fe/S flux ratio in the process of Takahashi as suggested by Sasaki in order to form a pure pyrite film at lower temperatures, such as within the claimed range, especially since Takahashi is concerned with forming single phase pyrite and the relationship between the growth temperature and the partial pressure of sulfur can be extrapolated to other known methods of depositing pyrite for solar energy applications as evidenced by Sasaki.

Thus, claims 1, 8, 10, 11, 13, and 15 would have been obvious within the meaning of 35 USC 103 over the combined teachings of Takahashi and Sasaki.

Response to Arguments

3. Applicant's arguments filed 6/4/2009 have been fully considered but they are not persuasive. Applicant argues that the disclosures of Takahashi and Sasaki, alone or in combination, do not describe all the limitations of the claims including CVD at atmospheric pressure and at temperatures between 375-425°C. The examiner disagrees. Takahashi discloses a method of depositing pyrite using CVD at atmospheric

Art Unit: 1792

pressure (Abstract) and Sasaki teaches depositing pyrite at lower temperatures by adjusting the Fe/S ratio (p. 1194). It would have been obvious to adjust the Fe/S ratio as suggested by Sasaki during the method of Takahashi, especially since Takahashi uses a Fe precursor and a S precursor, in order to form single phase pyrite at lower temperatures. Thus, the combination of Takahashi and Sasaki teach all the limitations of the claims.

Applicant argues that there is no suggestion or motivation to combine the temperature ranges suggested by Sasaki, which are related to low pressure MOCVD, with the disclosure of Takahashi, which is related to atmospheric pressure CVD. The examiner disagrees. Although Sasaki discloses a low pressure CVD method, Sasaki also teaches that high partial pressure of sulfur can be a critical factor to prepare pure pyrite and once this condition is satisfied, pure pyrite phase can be prepared by other methods (p. 1193, col. 1). Sasaki also discloses a relationship between the Fe/S ratio, the growth temperature, and the phases of pyrite (Fig. 1-3, p. 1195, col. 2). Thus, it would have been obvious to one of ordinary skill in the art to use the relationship between the Fe/S ratio and pyrite phases disclosed by Sasaki to adjust the Fe/S ratio in the process of Takahashi in order to deposit a single phase pyrite film at lower temperatures, especially since it would be easy to adjust this ratio given that Takahashi uses separate iron and sulfur precursors.

Conclusion

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

Art Unit: 1792

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elizabeth Burkhart whose telephone number is (571)272-6647. The examiner can normally be reached on M-Th 7-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic

Application/Control Number: 10/525,443

Page 6

Art Unit: 1792

Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Elizabeth Burkhart/
Examiner, Art Unit 1792

/Timothy H Meeks/
Supervisory Patent Examiner, Art Unit 1792